

## EXPLANATION OF PLATE II.

- Fig. 1. *Perichæta ceylonica*. Clitellum and neighbouring segments: *a* and *b*, openings of glands lettered *a* and *b* in fig. 2.
- Fig. 2. Prostate glands of same: *a*, coiled tubular gland; *b*, multilobate gland.
- Fig. 3. Genital seta of same.
- Fig. 3 *a*. Distal extremity of genital seta.
- Fig. 4. Diagrammatic transverse section of segment 9 of *Moniligaster Barwelli*. *a*, alimentary canal; *D*, dorsal blood-vessel; *y*, ventral blood-vessel; *n*, nerve-cord; *T*, testis; *v.d.*, vas deferens; *p*, prostate; *v.s.*, lateral blood-vessel connecting dorsal and ventral blood-vessels; *s*, ventral pair of setæ; *s'*, dorsal pair of setæ.
- Fig. 5. *C.p.*, copulatory pouch of same; *n*, nerve-cord; *s*, ventral pair of setæ; *s'*, dorsal pair of setæ.
- Fig. 6. Portion of vas deferens of same (*v.d.* in fig. 4), highly magnified.
- Fig. 7. Copulatory pouch of an example of *Perichæta posthuma*; three pouches in one segment (no. 8).

XI.—Some new Infusoria from American Fresh Waters.—  
No. 2. By Dr. ALFRED C. STOKES.

[Plate I.]

*Heteromita variabilis*, sp. nov. (Pl. I. fig. 1.)

Body soft, flexible, and very changeable in shape, subspherical, ovate, elongate, subcylindrical, frequently with both extremities curved towards the ventral aspect, and often with the anterior border slightly and obliquely emarginate; endoplasm granular; flagella very unequal in length, the trailing appendage twice as long as the contracted body, the vibratile one third or one fourth of the length of the body; contractile vesicle single, spherical, located near the centre of the ventral surface; nucleus single, subspherical, near the posterior extremity. Length of body  $\frac{1}{2250}$  to  $\frac{1}{1125}$  inch.

*Hab.* The apparently empty body of a dead *Canthocamptus minutus*, Müller.

Fig. 1 shows some of the changes in form assumed by this remarkably metabolic creature, of which the posterior extremity is especially soft and changeable in shape. The infusorian differs from all other members of its genus in the proportionate length of the flagella, the vibratile appendage being shorter than that of any previously recorded species. The animalcules were observed crowding the empty body of a dead *Canthocamptus*.

*Paramonas alata*, sp. nov. (Pl. I. fig. 2. Diagram.)

Body ovate, persistent in form, about twice as long as broad, widest and rounded posteriorly; traversed longitudinally

by four compressed, equidistant, somewhat obliquely directed keel-like elevations, thus exhibiting in horizontal optic section four diverging wing-like appendages or processes; oral aperture conspicuous; flagellum about twice as long as the body; endoplasm transparent, colourless. Length of body  $\frac{1}{11\frac{1}{25}}$  inch.

*Hab.* Pond-water, with *Ceratophyllum demersum*, L.

In fig. 2 is delineated a diagrammatic horizontal optic section, showing the arrangement of the alæ.

CLOSTENEMA\*, gen. nov.

Animalcules naked, free-swimming, fusiform or elongate, persistent in shape; flagella two, diverse in length, originating near together at the anterior border, the longer extended in advance, the shorter usually held beneath the lower surface, both vibratile; pharyngeal passage present, and apparently communicating with the contractile vesicle.

*Clostenema socialis*, sp. nov. (Pl. I. fig. 3.)

Body fusiform, three times as long as broad, the frontal border obliquely emarginate, the posterior extended in a short rounded prolongation; long flagellum equalling or exceeding the body in length, the short one about one fourth or one fifth the length of the infusorian; pharyngeal passage extremely narrow; contractile vesicle double, in the anterior body-half, near one lateral border; nucleus apparently subcentral; endoplasm colourless, slightly granular. Length of body  $\frac{1}{15\frac{6}{10}}$  inch. Anal aperture not observed.

*Hab.* Standing water, with *Lemna*. Gregarious.

Reproduction takes place by longitudinal fission, presumably after conjugation, which was observed. While swimming the animalcules advance evenly and rather slowly without revolution on their axis, the long flagellum being held in advance, the distal extremity most actively vibrating. The favourite position seems to be a quiescent one in companies, with the frontal border in contact with a mass of débris, or an algal filament, the flagella vibrating and extending quickly in various directions. No oral aperture could be positively discerned, although what I have interpreted as a very narrow pharyngeal passage was apparent. The granules within the endoplasm have a tendency to collect in the posterior prolongation, as if an anal aperture might be present there, but none has yet been noticed. The entrance of solid food-particles through the pharynx also escaped prolonged observation.

Its systematic position is probably among the Spheno-

\* κλωστής, a spindle; νήμα, a thread.

monadidæ of Saville Kent, immediately preceding *Sphenomonas*, from which it is excluded by its smoothly rounded surface and the position of the short flagellum, which, although vibratile, is more or less trailing, and habitually held beneath the body. Several individual animalcules have been observed with a bulbous enlargement to the distal extremity of the long flagellum.

CYCLANURA\*, gen. nov.

Animalcules free-swimming, persistent in shape, compressed, the posterior extremity evenly rounded, and never exhibiting a caudal prolongation; otherwise as in *Phacus*.

This Infusorian, which is *Phacus* without the caudal prolongation, bears the same relationship to that genus as *Englena* to *Amblyophis*.

*Cyclanura orbiculata*, sp. nov. (Pl. I. fig. 4.)

Body ovate or suborbicular, thick, compressed, scarcely longer than broad, having an excentric, longitudinal, keel-like elevation across the right-hand side; frontal border conspicuously emarginate; cuticular surface longitudinally striate; colour grass-green; endoplasm enclosing a spherical, posteriorly located amylaceous corpuscle; contractile vesicle anteriorly placed, in close proximity with the red pigment spot. Length of body  $\frac{1}{550}$  inch.

*Hab.* Stagnant pond-water.

This rather peculiar form would seem to be foreshadowed by *Phacus acuminatus*, Stokes †, in which it is only necessary to suppress the short, straight, and sharply-pointed caudal prolongation, to have essentially the infusorian here described. The latter is, however, nearly twice as large as *Ph. acuminatus*, and its body is very much thicker and stouter. It is, indeed, more robust in every particular than any previously recorded species of the genus. This peculiarity is conspicuously apparent.

*Chrysopyxis urceolata*, sp. nov. (Pl. I. fig. 5.)

Lorica urceolate, less than twice as long as broad, widest anteriorly, tapering posteriorly to an obtusely rounded point of attachment, the margins then convex; or with nearly straight lateral borders and an acute point of attachment; narrowed anteriorly and prolonged as a short, truncate, neck-like portion with slightly converging margins; animalcule sub-spheroidal, occupying the centre of the lorica, to which it is in

\* κυκλᾶς, round; α, privative; οὐρά, tail.

† 'American Monthly Microscopical Journal,' Oct. 1885.

no way attached; flagella projecting considerably beyond the lorica mouth, widely diverging; colour bands yellow, laterally placed; contractile vesicle single or double, minute, posteriorly located. Length of lorica  $\frac{1}{2250}$  inch.

*Hab.* Freshwater, attached to filamentous Algæ. Gregarious.

*Chrysopyxis dispar*, sp. nov. (Pl. I. fig. 6 and 6 a.)

Lorica urceolate, once and a half to twice as long as broad, widest anteriorly, tapering posteriorly to a subacute point of attachment, the lateral borders then nearly straight; or the body of the lorica subspherical, tapering, and constricted posteriorly; both forms narrowed anteriorly to produce a straight, more or less conspicuous neck-like prolongation; a curved partition extending transversely across the lorica near the centre, and dividing its cavity into two unequal parts; animalcule subspheroidal, not attached to the lorica, but supported by the transverse partition; colour bands yellow, lateral. Length of lorica  $\frac{1}{1500}$  to  $\frac{1}{1500}$  inch.

*Hab.* Freshwater, on confervoid Algæ, in company with the preceding.

*Urotricha platystoma*, sp. nov. (Pl. I. fig. 7.)

Body oval or somewhat obovate, less than twice as long as broad, subcylindrical, entirely ciliate, the cilia vibrating irregularly and independently, shortest and least numerous on the posterior border; cuticular surface conspicuously ornamented by minute hemispherical elevations arranged in longitudinal series; oral aperture apical, the margins slightly protruding, giving it a pouting aspect; posterior springing hair shorter than the body, obliquely directed, its distal extremity usually curved; contractile vesicle single, spherical, near the lateral border of the posterior extremity; anal aperture postero-terminal near the pulsating vacuole. Length of body  $\frac{1}{660}$  inch.

*Hab.* Standing water, with *Sphagnum*; movements rotatory and leaping by means of the posterior seta. Reproduction by transverse fission.

The oral aperture is enormously expansile. An individual has been seen attempting to engulf the empty lorica of *Trachelomonas volvocina*, Ehr., expanding the oral orifice to an extent nearly equalling the diameter of the spherical shell. The position of the anal aperture has not been previously observed in the species of this genus.

*Tillina campyla*, sp. nov. (Pl. I. fig. 8.)

Body elongate-ovate, entirely ciliate, soft, flexible, about three times as long as broad, widest and rounded posteriorly,

the anterior extremity recurved towards the ventral surface, the ovate oral aperture placed in the ventral concavity thus formed; cuticular surface longitudinally striate; pharynx short, recurved, the roof bearing a series of fine cilia, longest anteriorly, and projecting beyond the oral aperture; contractile vesicle single, spherical, posteriorly placed near the ventral surface; nucleus single, subspherical, and subcentral. Length of body  $\frac{1}{4\frac{1}{5}}$  inch.

*Hab.* Standing water, with dead leaves. Movements rapid.

The pharyngeal ciliation seems to be confined to the superior wall or roof. The cilia are very fine, and usually vibrate synchronously, thus presenting so close a resemblance to an undulating membrane, that their character can be satisfactorily determined only when the infusorian is in a dying condition.

*Amphileptus monilatus*, sp. nov. (Pl. I. fig. 9.)

Body elongate, subfusiform, about fifteen times as long as broad, the dorsal surface flattened, the ventral convex, the anterior trunk-like portion forming one fourth of the entire length of the body; the posterior attenuate tail-like part about one sixth of that length, the trunk bearing a fringe of larger cilia on its lower surface, and an even inferior row of trichocysts; contractile vesicles small, numerous, in a single series along the dorsal border, but not extending into the posterior attenuation; nucleus moniliform, the nodules small, ovate; pharynx conical, finely plicate; anal aperture at the base of the caudal prolongation. Length of body  $\frac{1}{3\frac{1}{5}}$  inch.

*Hab.* Still water, with *Ceratophyllum* and *Utricularia*.

In general appearance this Infusorian closely resembles *A. gigas*, C. & L., differing chiefly in the shorter trunk, and especially in the moniliform nucleus, the latter, in *A. gigas*, being band-like.

In connexion with *A. gigas* I have been able to verify the statement of Wrzesniowski, that reproduction takes place by oblique central fission. The first noticeable change in the appearance of the body is the development of an obliquely directed subcentral ridge apparently surrounding the animalcule. The division is rapid, the anterior portion of the posterior moiety being very obliquely truncate and finally developing into the trunk; the posterior surface of the anterior part being evenly rounded immediately after fission. The oral aperture and conical pharynx are formed in the posteriorly separating moiety before the final division of the two individuals. Conjugation has been observed with a form which I have identified

doubtfully with *A. margaritifer*, Ehr., union taking place between the parts anterior to the oral aperture, this orifice being occasionally included.

*Loxophyllum vorax*, sp. nov. (Pl. I. fig. 10.)

Body elongate lanceolate, three times as long as broad, longitudinally striate, soft, flexible, and elastic, both extremities rounded and somewhat curved towards the ventral border, the posterior widest, the body tapering thence towards the frontal region; oral aperture subterminal, enormously expansile; dorsal border convex, the ventral usually flattened; nucleus single, ovate, subcentral; contractile vesicle single, spherical, situated near the ventral border of the posterior extremity; trichocysts numerous, conspicuous, arranged in a parallel series perpendicular to the frontal, dorsal, and posterior borders; anal aperture not observed. Length of extended body  $\frac{1}{190}$  inch.

*Hab.* Standing water, with *Sphagnum*.

In a single instance the transparent colourless body was wonderfully distorted by the internal pressure of two *Rotifers* which the Infusorian had engulfed. The body was here scarcely longer than broad, and the surface was most irregularly protruded. As digestion was accomplished the normal contour was resumed, and the animal's sluggish movements became more active. When swimming the movements are often rotatory on the long axis.

*Colpidium putrinum*, sp. nov. (Pl. I. fig. 11.)

Body ovate, less than twice as long as broad, longitudinally striate, the anterior extremity obtusely pointed, the ventral surface slightly flattened; vibratile membrane small; contractile vesicle single, spherical, laterally located near the posterior extremity; nucleus subspherical, subcentrally placed; endoplasm granular, usually crowded with small spherical food-masses; anal aperture inferiorly postero-terminal. Length of body  $\frac{1}{450}$  to  $\frac{1}{650}$  inch.

*Hab.* A putrid vegetable infusion in creek-water.

Reproduction is by transverse fission, a second contractile vesicle generally appearing previous to the beginning of the process.

*Colpidium striatum*, sp. nov. (Pl. I. fig. 12.)

Body subreniform, twice as long as broad, longitudinally striate, the anterior extremity slightly curved towards the ventral aspect; vibratile membrane conspicuous; contractile

vesicle single, spherical, postero-lateral, often leaving several small vacuoles after systole; nucleus single, subcentral. Length of body  $\frac{1}{5.06}$  inch.

*Hab.* An infusion of decaying aquatic vegetation.

In form this resembles *C. cucullus* (Schrank), S. K., being somewhat more curved anteriorly. It differs in having but one nucleus, and in the postero-lateral position of the pulsating vacuole. Reproduction is by transverse fission.

#### DIPLOMASTAX, gen. nov.

Animalcules free-swimming, holotrichous, elongate-ovate, subcylindrical, produced posteriorly in a more or less retractile tail-like prolongation; oral aperture ventral, enclosing two vibratile membranes; contractile vesicle single; trichocysts absent.

The proper position of the genus is probably with the Ophryoglenidæ of Kent, although the presence of two vibratile membranes will necessitate a slight change in the diagnosis of the family as now formulated.

*Diplomastax frontata*, sp. nov. (Pl. I. figs. 13 and 14.)

Body elongate-obovate, subcylindrical, transparent, longitudinally striate, and finely reticulated, five times as long as broad, the lower or ventral surface convex, the dorsal slightly concave, tapering posteriorly to a somewhat retractile tail-like prolongation forming about one fifth of the entire body; anterior extremity narrowed, obtusely pointed; oral aperture narrow, ovate, obliquely placed on the ventral or convex surface at some distance from the anterior extremity, enclosing two small vibratile membranes; contractile vesicle single, spherical, near the centre of the dorsal or concave border; nucleus presumably represented by a large, ovate, subcentral, clear space. Length of body  $\frac{1}{18.0}$  inch.

*Hab.* Still water, with *Myriophyllum*.

The aspect of this interesting Infusorian floating on the concave or dorsal surface, with the obliquely placed oral aperture thus directed upwards, at once suggests the thought of a microscopic shark—the suggestion and the resemblance not being far-fetched. It is the appearance, however, that brings the shark to mind.

Reproduction is accomplished by transverse fission, presumably after conjugation, which I have observed, union being made at the anterior portions of the ventral surfaces. When fission is about to take place that part of the body in advance

of the oral aperture elongates, an opening, which finally becomes the mouth of the anterior moiety, forming at or near the frontal border and developing from each side a very conspicuous vibratile membrane, the one on the right-hand margin usually being the larger. The frontal cilia are then also more conspicuous and apparently larger than in the mature individual. The dividing portion finally separates, having the posterior tail-like prolongation and a terminal oral aperture containing the two prominent membranes, leaving the posterior or original animalcule apparently unchanged. The separated moiety, which at first but remotely resembles the mature animalcule, remains sluggish for some time. The large, projecting, flap-like membranes on the frontal border seem to be an incumbrance, and, until the oral aperture assumes its proper position and the membranes become enclosed, the Infusorian seldom moves unless jostled by some more active inhabitant of the live-slide, when it quickly darts forward only to resume its quiet waiting. The existence of the two vibratile flaps might readily have been overlooked, or the two mistaken for a single one, if reproductive fission had not been observed, since to separate them, even with a high-power objective, is no easy matter.

HISTIOBALANTIUM\*, gen. nov.

Animalcules free-swimming, heterotrichous, ovate, somewhat depressed, persistent in shape, the ventral aspect flattened; setose hairs abundantly developed on all parts of the surface; the oral fossa near the centre of the ventral aspect, on the left-hand side of the median line, ovate, capacious, the cilia of the left-hand border long, fine, setose, the frontal wall bearing a ciliary tuft, and the right-hand margin supporting an undulating membrane, which forms posteriorly a freely motile infundibuliform sack continued backward as a narrow membranous tubular passage, at the posterior extremity of which is the oral aperture, the oral fossa also enclosing anteriorly a secondary vibratile tuft of long cilia; contractile vesicle multiple; nucleus ovate, anteriorly situated.

Inhabiting fresh waters.

This Infusorian is excluded from the Bursariadæ of Stein by the presence of the vibratile membrane, to say nothing of the remarkable infundibuliform sack with the tubular posterior prolongation and the anterior ciliary tufts. The adoral cilia fringing the left-hand border of the oral fossa apparently do not surround the posterior margin of the peristomial depres-

\* *ιστίον*, a membrane; *βαλάντιον*, a little sack.



sion, but are there met by the cilia of the right-hand margin, which do not conspicuously differ from those clothing the cuticular surface. From the remaining families of the order this Infusorian is excluded by the linear arrangement of cilia just referred to; the formation of a new family group will therefore be necessary for its reception, the position of the new group in a system of classification being immediately following Stein's Bursariadæ and preceding the Spirostomidæ of Kent, Histiobalantiidæ necessarily being the family title.

*Histiobalantium agile*, sp. nov.

(Pl. I. figs. 15 and 16.)

Body ovate, one and a half times as long as broad, somewhat depressed, the dorsal surface convex, the ventral slightly flattened, both extremities evenly rounded; the left-hand body-margin evenly convex, the right-hand border gibbous; cuticular cilia abundant, curved; numerous long, fine, setose hairs projecting from all parts of the surface; oral fossa ovate, capacious, situated near the centre of the right-hand side of the ventral aspect, its posterior region supporting a conspicuous retractile and freely motile infundibuliform membranous sack, which is posteriorly prolonged as a narrow, flexible, membranous, and tubular passage leading to the oral aperture, and anteriorly continued as a broad undulating membrane attached to the right-hand border of the oral fossa, and as an inconspicuous membranous velum adherent to the left-hand side of the same depression and enclosed within it; adoral cilia on the left-hand margin of the oral depression long, fine, setose; a broad tuft of long setose cilia springing from the frontal border of the oral fossa and directed backward, a second broad tuft of vibratile setose cilia anteriorly enclosed within the oral cavity, attached to the anterior superior wall, their posterior extremities free; oral aperture near the posterior extremity of the body, followed by a short somewhat adcurved pharyngeal passage; contractile vesicles small, multiple, scattered; nucleus ovate, situated near the anterior border; anal aperture not observed; endoplasm granular, colourless, transparent. Length of body  $\frac{3}{8}\frac{1}{5}$  inch.

*Hab.* Fresh water, with *Ceratophyllum*.

The enclosed adoral sack and its posterior tubular prolongation appear to be adherent to the walls of the oral fossa only at the points where the tubular passage surrounds the oral aperture, and anteriorly by the membranous continuation of the infundibulum. The entire organ, composed of bag-like velum and tubular adoral passage, is freely motile, being variously protruded and retracted and rolled from side to side,

the thin anterior right-hand membrane being at times thrust into the oral fossa or arched above it like a protecting shield. The enclosed superior vibratile tuft of cilia which, so far as I have observed, never protrudes beyond the margin of the oral fossa, is, when not in motion, usually pressed upward against the roof of the cavity, and when the Infusorian is viewed in a lateral position, or in vertical optic section, appears like the thickened edge of a vibratile membrane; it is only when the animalcule is examined by focussing through the thickness of the body from the dorsal surface, or when the creature fortunately comes to rest with the ventral aspect towards the observer, that the true character of the organ can be ascertained. The cluster widens posteriorly by a separation of its constituent cilia, as also does the lower and more nearly external frontal tuft. The latter, however, seldom or never vibrates. Its function appears to be to assist in imprisoning the food by closing down over the cavity, or by entering the latter in company with the undulating membrane.

The setose hairs extending beyond the cuticular cilia are about twice their length. They are evidently tactile in function, being used to inform the Infusorian of the approach of food or of an enemy to be avoided. If the former, the animalcule immediately and most actively leaps upon it, seizing and forcing it into the endoplasm so quickly that, although I have repeatedly witnessed the act, I am ignorant of the precise method employed in the capture. If an approaching free-swimming animalcule ever so slightly touches a setose hair on any part of the surface, *Histiobalantium* at once leaps upon it, frequently making a half-revolution on the transverse axis, and seldom missing the object wished for. The undulating membrane closes over the oral depression, often forcing itself within the cavity; the Infusorian makes a strong contractile, somewhat convulsive effort, at once reminding the observer of the similar movement by *Floscularia ornata* when food is passing onward towards the mastax, and the captive is dashed through the oral aperture into the posterior part of the body, whence it is gradually transferred to the anterior and dorsal regions for digestion. The whole act is performed with remarkable swiftness, the food being accompanied by an unusually large bubble of water, as if the oral fossa had poured its entire liquid contents into the endoplasm. This habit probably accounts for the development of the multiple contractile vesicles. The peculiar springing movements described are, it is supposed, caused by the sudden action of the setose hairs so abundant on the body.

The entire oral apparatus is remarkably complex. I may

therefore have misinterpreted some of the appearances. My drawings are, I fear, little more than diagrams.

*Rhabdostyla pusilla*, sp. nov. (Pl. I. fig. 17.)

Body campanulate, tapering posteriorly, less than twice as long as broad; cuticular surface transversely striate; peristomial border revolute, slightly exceeding the body-centre in width; pedicle scarcely longer than the body; contracted animalcule ovate. Length of body  $\frac{11}{1125}$  inch.

*Hab.* Pond water, on *Ceratophyllum*.

Thus far but three individuals of this readily recognizable form have been met with, all of these being attached near together on a fragment of *Ceratophyllum*. It is the smallest member of the genus yet observed, and could easily be identified by its diminutive proportions alone. Each of the three specimens noted had the pedicle attached as shown in the figure, the extremity being adherent to the side of the plant opposite to that on which the Infusorian habitually expanded itself, the lower portion therefore curving around the basis of support and apparently acting as a spring whereby the contracted animalcule was suddenly and rapidly thrown to that side of the plant to which the pedicle was attached, the body of the animalcule then, as well as on its return to the former position, describing a semicircular path through the water. That this is, as I believe, characteristic of the species can be determined only by examining a larger number than has yet been obtained.

*Vorticella Lemnæ*, sp. nov. (Pl. I. fig. 18.)

Body conical-campanulate or subpyriform, not changeable in shape, less than twice as long as broad, widest centrally, the posterior extremity tapering; cuticular surface finely striate transversely; peristomial border revolute, not everted, slightly narrower than the body-centre; pedicle from two to three times as long as the body; pharyngeal passage long; contractile vesicle close to the vestibulum. Length of body  $\frac{1}{900}$  inch.

*Hab.* Pond water, on the rootlets of *Lemna*. Solitary.

In form this resembles *V. octava*, Stokes \*, but is readily recognized as different by its persistence of shape, by the proportionate length of the pedicle, and especially by the absence of the peculiar twisted appearance of the sheath.

\* This journal, June 1885.

*Vaginicola ampulla*, sp. nov. (Pl. I. fig. 21.)

Lorica retort-shaped, erect, about three times as long as broad, widest posteriorly, tapering thence to the rounded point of attachment, and anteriorly to the curved neck-like portion; aperture obliquely directed, the margins very slightly everted, the frontal border truncate; enclosed animalcule, when fully extended, projecting for about one third of its length beyond the lorica. Length of lorica  $\frac{1}{1\frac{1}{5}}$  inch.

*Hab.* Fresh water; attached to filamentous Algae.

The lorica is hyaline when young, becoming deep chestnut-brown with age. Very frequently individual loricae were observed with varying proportions of the posterior region coloured and semiopaque, while the frontal portion remained colourless and transparent, others with the entire sheath darkly tinged being almost as numerous. This leads me to suggest that *Vaginicola vestita* (the *Planicola vestita* of De Fromentel), in which the colour is described as being restricted to the posterior part of the lorica, may have been diagnosed from an Infusorian approaching maturity, and consequently beginning to assume its mature coloration. This seems more plausible than Saville Kent's conjecture that the sheaths may have been repaired, or that the animalcule had occupied an old and deserted lorica on which it had built a new frontal addition.

## BALANITOOZON \*, gen. nov.

Animalcules free-swimming, ovate or subpyriform, persistent in form, not cuirassed, the anterior portion of the cuticular surface clothed with vibratile cilia, the posterior region naked; oral aperture apical, without larger adoral cilia; pharynx apparent; a single postero-terminal seta present; animalcules leaping as well as swimming.

Inhabiting fresh water.

The ciliation of the anterior one half or two thirds of the cuticular surface, the absence of a series of differentiated oral cilia, and the reduction in the number of the springing hairs to one, and the position of that one on the posterior extremity of the body, exclude this remarkable Infusorian from the Halteriidae of Claparède and Lachmann. Its ordinal position, the writer supposes, is among the Peritricha, although there is at present no type known in that infusorial order to which it bears a resemblance, the extensive ciliation of the anterior region and the absence of distinct oral cilia being characteristic of *Balanitoozon* alone. Only a slight effort of the imagi-

\* *βαλανίτης*, shaped like an acorn; ζῶον.

nation is needed to further suggest that this form is connectant or transitional between the Holotricha and the Peritricha, the presence of cilia on the posterior body region being alone needed to relegate the creature to the former order, and the development of distinctly differentiated adoral cilia, in addition to the cuticular series now existing, being only necessary to admit it as an undoubted member of the Peritricha. Its peculiar springing or leaping movements call to mind the similar saltatory efforts of *Halteria*. Occasionally a depression is formed around the body at a short distance from the posterior extremity, when the little creature not remotely resembles an acorn in its cup, an appearance that suggested the generic name.

*Balanitozoon agile*, sp. nov. (Pl. I. fig. 19.)

Body conical or subpyriform, less than twice as long as broad, widest and truncate posteriorly, thence tapering to the frontal border; the anterior two thirds only of the cuticular surface clothed with long adcurved cilia; posterior terminal seta subequal to the body in length, its distal extremity usually curved; oral aperture apical; anal opening not observed; contractile vesicle single, spherical, situated near one side of the posterior border; nucleus small, subspherical, placed near the centre of one lateral margin; endoplasm colourless, often granular posteriorly, and enclosing coloured food particles; movements rotatory on the longitudinal axis, with frequent and violent lateral leaps. Length of body  $\frac{1}{1500}$  inch.

*Hab.* Standing water, with *Sphagnum*. Reproduction by transverse fission.

The cuticular cilia appear to be disposed in distinct parallel circles, not in the spirals so common to the Peritricha. Neither is there any sign of the peritrichous arrangement of an anterior or adoral ciliary wreath where one arm of the spiral descends into an oral fossa, since no fossa exists here, the oral aperture being a minute orifice followed by a short but distinctly visible pharyngeal passage. The cilia are comparatively long and are usually curved towards the frontal extremity.

The movements, in addition to the sudden lateral leaps, which are presumably caused by the action of the postero-terminal seta, are rapid and erratic. Reproduction is by transverse fission, the springing seta being developed from the posterior portion of the anterior moiety, and projecting obliquely from and beyond the deepening constriction for a long time before the final separation of the animalcule.

*Uroleptus Sphagni*, sp. nov. (Pl. I. fig. 20.)

Body clavate or broadly obovate, depressed, three times as long as broad, extensile posteriorly; widest and rounded anteriorly, somewhat curved towards the left-hand side, thence tapering to an attenuate, usually pointed, caudal prolongation, which, when extended, equals or exceeds in length the greatest width of the body; lip crescentic, prominent; anterior border somewhat curved towards the dorsal aspect, thus forming a conspicuous transverse groove or depression on the frontal region of the dorsum; peristomial field broad, extending through the anterior one third of the ventral surface, its posterior termination curved toward the right-hand side, the left-hand margin bearing the adoral and a series of fine paroral cilia, the right-hand border finely ciliated and supporting an undulating membrane; frontal styles four or five; ventral setæ in two median lines extending into the caudal prolongation; marginal setæ projecting posteriorly, those on the left-hand side originating at the posterior extremity of the peristomial field in close proximity to the ventral setæ, and extending obliquely and longitudinally towards the posterior portion of the left-hand border; contractile vesicle single, spherical, on the left-hand side of the peristome-termination, near the body-margin; nucleus double, elongate-ovate, with a laterally-attached nucleolus; dorsal hispid setæ numerous, fine and short; anal aperture on the left-hand border of the dorsal surface near the origin of the caudal prolongation. Length of body  $\frac{1}{100}$  inch.

*Hab.* Standing water, with *Sphagnum*.

The caudal prolongation is very frequently extended until it becomes almost filiform. It is then also often arcuately curved. In the numerous specimens examined I have been able to determine the existence of but one nucleolus, which is attached to the anterior nuclear nodule. Even the use of reagents failed to disclose a second.

## EXPLANATION OF PLATE I.

- Fig. 1. *Heteromita variabilis*,  $\times 675$ .  
 Fig. 2. *Paramonas alatu*. Diagram.  
 Fig. 3. *Clostenema socialis*,  $\times 1225$ .  
 Fig. 4. *Cyclanura orbiculata*,  $\times 330$ .  
 Fig. 5. *Chrysopyxis urceolata*,  $\times 1350$ .  
 Figs. 6 & 6 a. *Chrysopyxis dispar*,  $\times 1350$ .  
 Fig. 7. *Urotricha platystoma*,  $\times 330$ .  
 Fig. 8. *Tillina campyla*,  $\times 400$ .  
 Fig. 9. *Amphileptus monilatus*,  $\times 100$ .  
 Fig. 10. *Loxophyllum vorax*,  $\times 266$ .